



Hardy Fern Foundation Quarterly

Volume 1, Number 1, Spring 1978

THE HARDY FERN FOUNDATION

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The Hardy Fern Foundation was founded in 1989 to establish a comprehensive collection of the world's hardy ferns for display, testing, evaluation, public education and introduction to the gardening and horticultural community. Many rare and unusual species, hybrids and varieties are being propagated from spores and tested in selected environments for their different degrees of hardiness and ornamental garden value.

The primary fern display and test garden is located at, and in conjunction with, The Rhododendron Species Botanical Garden at the Weyerhaeuser Corporate Headquarters, in Federal Way, Washington.

Satellite fern gardens are at the Stephen Austin Arboretum, Nacogdoches, Texas, Birmingham Botanical Gardens, Birmingham, Alabama, California State University at Sacramento, Sacramento, California, Dallas Arboretum, Dallas, Texas, Denver Botanic Gardens, Denver, Colorado, Georgeson Botanical Garden, University of Alaska, Fairbanks, Alaska, Harry P. Leu Garden, Orlando, Florida, Coastal Maine Botanical Garden, Wiscasset, Maine, Inniswood Metro Gardens, Columbus, Ohio, New York Botanical Garden, Bronx, New York, and Strybing Arboretum, San Francisco, California.

The fern display gardens are at Lakewold, Tacoma, Washington, Les Jardins de Metis, Quebec, Canada, University of Northern Colorado, Greeley, Colorado, and Whitehall Historic Home and Garden, Louisville, KY.

Hardy Fern Foundation members participate in a spore exchange, receive a quarterly newsletter and have first access to ferns as they are ready for distribution.

Cover Design by Willanna Bradner.

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THE HARDY FERN FOUNDATION

QUARTERLY

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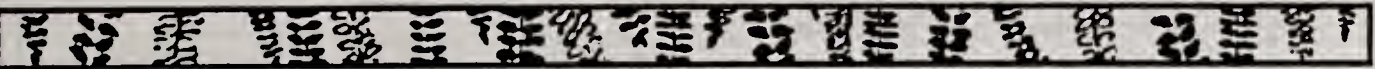
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President's Message

Anne Holt


No fooling, April the first was a perfect spring day at last with warm sunshine, blue skies, snow clad mountains emerging flowers and fern fronds. Memories of the Northwest Flower Show fade away. Spring is here.

There will be a fern display at the American Rhododendron Society annual convention April 27 to May 2, at the DoubleTree Hotel in Bellevue. This will be an opportunity to see the fern display under revision at the Bellevue Botanical Garden and for those headed for the Rhododendron Species Botanical Garden in Federal Way to view the newly renovated fern collection there.

The Hardy Fern Foundation is installing a fern garden at the Bainbridge Island Public Library in memory of the late board member and benefactor, Thomas Gillies. Mr. Gillies was associated with the Linda Hall Library in Kansas City for many years including eight years as director. Board member and landscape designer John van den Meerendonk has provided the design and with his company will install the garden as a gift to the HFF. He expects to use over 80 types of ferns and envisions the garden as a place to learn about ferns and to sit quietly and enjoy their beauty. The garden, John and The Hardy Fern Foundation all were featured recently in an extensive article in the Bainbridge Island newspaper. The garden should be complete later this spring and we thank John for his generosity.

I'm sorry to report that Roger Boyles who has jointly chaired the American Fern Society and Hardy Fern Foundation spore exchange has resigned. We thank him for his work and hope there will be a new director soon. (Any volunteers?)

Our annual Fern Festival will take place on June 4 and 5 at the Center for Urban Horticulture in Seattle. We are pleased to have Dr. Warren Herb Wagner Jr. of the University of Michigan as our guest speaker. (See related articles). He will speak on "Unusual Ferns" at 7:30 P.M. on June 4th. The Festival begins with a plant sale featuring ferns and companion plants from 1:00 to 4:00. We will have our annual meeting at 6:30 with plants for sale and coffee and goodies preceding the lecture. The sale continues on June 5 from 10:00 to 2:00. This is a wonderful opportunity to hear an outstanding speaker and acquire choice plants at the same time. I hope to see you all there.



THE HARDY FERN FOUNDATION
QUARTERLY

The Hardy Fern Foundation Quarterly is published quarterly by the Hardy Fern Foundation,
P.O. Box 166
Medina, WA 98039-0166.

Articles, photos, fern and gardening questions, letters to the editor, and other contributions are welcomed!

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"Unusual Ferns"**FERN FESTIVAL - JUNE 4, 1999****Warren Herb Wagner, Jr.**

Professor of Botany and Natural Resources (emeritus active)
University of Michigan, Curator, University herbarium and Museum of Zoology.

Past Chairman, Department of Botany;
Past Director U.M. Matthaei Botanical Gardens

Interests: Natural history, biodiversity, conservation, invasive species,
evolution (divergent and reticulate), public education

Teaching: Systematic Botany, Woody Plants,
various field courses including biological stations

Graduate program: Member of over 235 doctoral committees

Publications: Over 400 articles, reviews, chapters in books,
books "The Fern Genus *Diellia*," "Michigan Trees" (with B. V. Barnes).

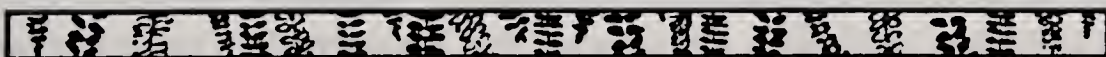
President or chairman Michigan natural history organizations: Michigan Botanical Club, Michigan Natural Areas Council, Michigan Committee on Rare and Endangered Plants, Michigan Entomological Society

President or chairman national or international organizations: Botanical Society of America, American Society of Plant Taxonomists, Society for the Study of Evolution, American Fern Society, International Association of Pteridologists

Awards and recognition: University of Michigan: Distinguished Faculty Achievement Award, Outstanding Teacher Awards, Distinguished Senior Lecturer. Extra-curricular: Botanical Society of America Merit Award, American Fern Society Honorary Member, Fellow American Association for the Advancement of Science, American Society of Plant Taxonomists Asa Gray Award, American Academy of Arts and Sciences Fellow, Honorary Member Phi Beta Kappa

Highest Honor: Elected 1985 to the U.S. National Academy of Sciences

Current Research: Ferns of Hawaii. Grapeferns and Adder's-tongues of the world. Protecting endangered species of disturbed sites



This lecture will deal with a variety of ferns and fern allies that have tremendous interest and sometimes beauty that are essentially overlooked in gardening, either in the hardy outdoor culture or in the conservatory. The use of different ferns in actual gardening practice will be analyzed, and an estimate will be made of how many major fern groups (genera, families) are not used at all. Reasons why they have not been used are discussed, and suggestions will be made of what new types might be considered. Color slides will illustrate the examples and the special uniqueness will be described.

MORE ABOUT THE WAGNER'S - Moonwort Madness: A Reply

Herb and Florence Wagner
University of Michigan

*Reprinted with permission from "The Fiddlehead Forum" Volume 25,
Number 4, September-October 1998.*

Our editor, Cindy Johnson-Groh, threw out a challenge to us in last year's "Fiddlehead Forum" (Vol. 24 (4):29). She asked "What is it about moonworts that originally captivated the Wagners' interest. Herb and Florence, what can you tell us about 'moonwort madness'? What captivates you?" Cindy must think that we've been moonlighting, because we have delayed so long in responding.

Well! It all started when Herb was about 15 years old and read in a book by Campbell Waters (1903) the following: "We do not soon forget, even if we might wish to, the first glimpse of a new fern...Once, while standing idly in a little hollow near a stream, there seemed to bob up two plants of the matricary grapefern (now commonly called the daisyleaf moonwort), and a new species was added to the state flora. Catbriers and poison oak had no terrors then, and a search on hands and knees brought to light about twenty-five more plants." Herb fantasized then whether he too might have such good luck, and thus became infected for the first time with the "moonwort madness". Two

years later he found one, a weird little gray-green plant, another record for the state of Maryland. Later, after much searching, he found many more specimens, and he wrote an article about them in 1941, the first of several hundred papers in his botanical career, including many on *Botrychium*. However, Herb will never forget his first moonwort.

During 1942-1946, Herb was flying in the navy and won the Second World War (or so Florence was led to believe after listening to his stories) all the while thinking about those intriguing moonworts. He would dream of hunting these little weirdos even while he flew over the oceans at night in the light of the full moon. He never thought of himself as being loony (flying over the Atlantic Ocean hunting for submarines to torpedo - what could be crazier?) While his navy buddies dreamed of going home and starting a quiet chicken farm, Herb thought only of going back to find moonworts. However, this was not to be for when he returned stateside - no moonworts. He spent four years at the University of California Berkeley getting his Ph.D. and one year at Harvard doing a postdoc. (Little did he know that a sleek beauty also studying botany at Berkeley would become his soul mate and faithful partner in Botrychiology.)

It was not until 1951 that Herb and Florence came to the University of Michigan in Ann Arbor. In 1952 and again in 1954, they went to the U. of Michigan Biological Station at Douglas Lake where they came to discover new and exciting moonworts. They clarified the differences between the common moonwort

Moonwort

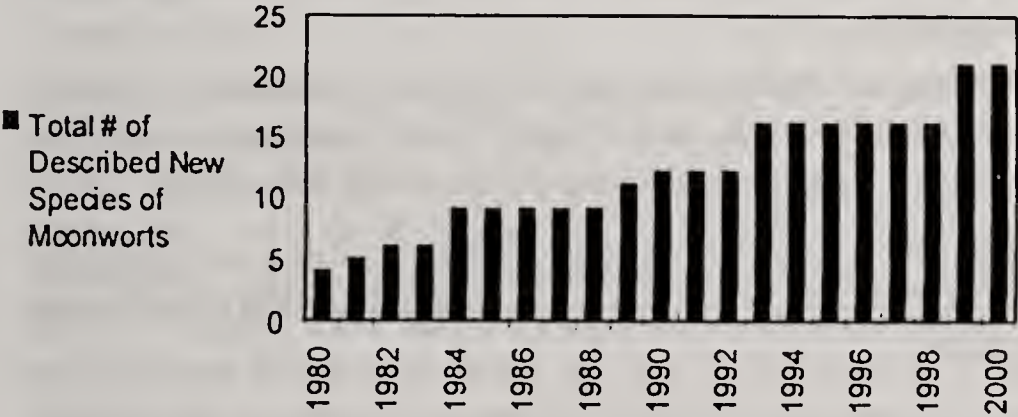


and the mingan moonwort, and they encountered the goblin moonwort for the first time. Then for many years, they taught pteridology at other biological stations, where they spread the disease known as "moonwort madness". The epidemiology of the disease is well known. Students contracted the virus (for which there is no known vaccine) at the U. of Virginia, Mountain Lake in 1962, '64, '70, '72, '74 and '82; at the U. of Minnesota, Lake Itasca in 1973, '75 and '79; and at the U. of Montana, Flathead Lake in 1976, '78, and '80. At first our poor students could not figure us out as we crawled around on the ground, parting the forbs and grasses, and shouting, "I found one"! Nevertheless we eased the infection by awarding an "A" for the day to each student who found a moonwort. The students began showing an interest, and before long they too became victims of the mania: eyes directed forward and downward, jaws tightly pressed together in concentration, expecting anything (and most of the time finding nothing). In spite of their heroic efforts, the students who could not find moonworts had to resort to heavy drinking and taking drugs. Those who developed full symptoms of "moonwort madness" began returning to field repeatedly on their own.

Eventually we came to a point where we could either consult a psychiatrist or go to the National Science Foundation (NSF) for aid. We chose the latter and were awarded a grant for monographic studies starting in 1979. The results of this program are now widely recognized. We had inherited a mixed up taxonomy. Clausen's 1938 monograph was way out of date. Fernald's 1950 treatment for the eastern U.S. was full of "forms" and "varieties" each of which needed to be examined. Some proved to be merely trivial variants not worthy of recognition, some proved to be true varieties, and some even proved to be good species. Our goal was to control our mania by producing a robust taxonomy that truly represented the real diversity. With aid from the NSF we were able to explore many marvelous localities; first in the Lake Superior Region and later in the western U.S. and Canada, and we soon realized that the situation in moonworts was far more complicated than we had ever dreamed.

We began to find new species. (There were only nine species previously recognized.) Our first discoveries were published in 1981 and we continue to find and publish new species. We predict that by 2000, with the help of our fellow moonwort maniacs, we will recognized 26 additional species previously un-

Figure 1. Total described new species by year.



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Moonwort Madness: A Reply *continued from page 25*

known to science (Figure 1). Moreover, we are also discovering interspecific hybrids, some of them quite extraordinary (e.g., the Waterton Lakes hybrid moonwort).

We have widely expanded the range of characteristics known among these plants. Florence had investigated the chromosomes of most of the now known species. Chromosome counts for moonworts vary from some with $2n=90$ to some with $2n=180$, and even some with $2n=270$ (the latter is the very rare false northwestern moonwort). Don Farrar has examined the enzymes of moonworts, and finds many fascinating correlations between species. Some of the other new and unusual characters are illustrated by the pumice moonwort (spores released not singly but in tetrads), the pale moonwort (strongly developed epicuticular wax), the triangle moonwort (albino forms), prairie moonwort (tiny vegetative gemmae, discovered by Don Farrar), and the goblin moonwort (partially sunken, weakly opening spore cases and other peculiarities studied by Cindy Johnson-Groh).

"Moonwort madness" may be regarded by some psychiatrists as the ultimate in lunacy. Nevertheless each year we learn about new patients who have been diagnosed as having the disease. Out of over a hundred that I know about, I can mention here only a few: Ed Alverson, Kathy Ahlenslager, Timothy Devine, Don and Joyce Dreif, Art Gilman, Stewart Garrett, Kirk Larson, Peter Lesica, Karen Myrrhe, Bob Preston, Kiri Yanskey, Tara Williams, and Peter Zika. Among the many victims, I know of individuals from at least 15 states and 5 provinces who have developed a compulsion to botrychulate.

You can see why "moonwort madness" is on the increase. As we all know now, it has been spreading widely over the past decade, and the Center for Disease Control has taken notice. Where will it all end? Once hooked, the victims can't stop. Moonstruck by these impertinent little fern allies, the mad victims are exhilarated when each spring comes and they can start exploring again the wonderful world of plants and these elusive botanical gems. To answer your question, Cindy, of what captivates us? What captivates you?

1. The *scientific* reason. New species and new biological insights are being added to our world of botanical knowledge.
2. The *conservation* reason. Many moonworts are extremely rare and potentially threatened or endangered. (In fact, the related Hawaiian grapefern is now apparently extinct.)
3. The *natural beauty* reason. The plants have intriguing and subtle shapes. The habitats are fascinating to explore - snow fields, prairies, woodlands and swamps, roadsides, weedy fields, mine spoils and meadows.
4. The *surprise* reason. We can never predict when or where a moonwort may be found. Discovery is always a thrill, a surprise. Hunting moonworts is a true treasure hunt.

"Moonwort madness" is one disease of which we hope you will get a good case. You will have fun! *Botrychium über alles! Vive les plantes à la lune!*

Polystichum makinoi

James R. Horrocks
Salt Lake City, Utah



Polystichum makinoi. Photo by Kim Durrant, Salt Lake City, Utah

Makino's Holly Fern, obviously named after Makino, is a very attractive species from Japan and China. It is a denizen of mountainous areas where it may be found in open woods or on wooded rocky slopes. This species is easily mistaken for several other *Polystichums*, notably *P. pseudo-makinoi*, *P. tagawanum* and even possibly *P. polyblepharum*. *Polystichum makinoi* has hybridized with the afore-mentioned species to produce, in Japan, a considerable number of natural hybrids according to Rush. It is a tetraploid according to Fraser-Jenkins, who has more recently reported it or a variety of it from Tibet and Manipur in the Himalayas.

Description: The rhizome, for the most part is erect or ascending, sending up a cluster of fronds in early spring. The straw-colored stipe is from one-quarter to one-third the length of the blade and sports three different kinds of scales, the lower and basal ones chestnut-brown, firm and lustrous with a paler membranous margin, the upper scales rather brown and membranous and the smallest ones brown and quite dense over most of the entire stipe and extending up into the rachis. The fronds are bipinnate and may be from eighteen inches to possibly as much as three feet in length in favorable localities. The evergreen fronds are lustrous but not as much so as *P. polyblepharum*. The pinnae are acute to acuminate, sporting the familiar *Polystichum* auricle. In *P. pseudo-makinoi*, the

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II. Susquehanna Gorge

American Fern Society Field Trip

Joan Eiger Gottlieb

On August 2, 1998 a second pre-A.I.B.S. trip left from Baltimore; this one headed to the **Susquehanna River Gorge**, an area very different in character – and plants – from the prior day's Pinelands excursion. This trip was led very ably by Jim Parks of Millersville University. The Susquehanna River, about an hour's drive from Baltimore's beautiful inner harbor, drains central Pennsylvania and Maryland through metamorphosed rocks of schist and gneiss as it flows into the Chesapeake. Its gorge, which can be 100m deep in its lower parts, hosts an amazingly diverse flora with many species, including ferns, that reach their northern or southern limits, similar in this respect to the Jersey Pinelands.

The first stop was in **Susquehanna State Park** near S.R. 161 in Maryland. This park has a rich history, including an old canal and tow path. The road along the canal is at the base of a mature forest slope. A seep provides perfect habitat for *Deparia acrostichoides*, *D. marginalis*, *D. intermedia*, *D. carthusiana*, *Polystichum acrostichoides*, and *Athyrium filix-femina asplenoides*, all of which were found right along the road cut, within a few hundred feet of the parking area near the rest facilities. But the major fern find here was the rare log fern, *Dryopteris celsa* and its robust hybrid with *D. marginalis* – *D. x leedsii*. Two specimens of the hybrid were identified largely by their unusually large size as well as the somewhat intermediary position of the sori. It was a real treat to see these elegant ferns in their natural, mesic forest habitat under a species-rich canopy of hickory, basswood, box elder, tulip poplar, silver maple, paw paw, bladdernut and spicebush. The invasive presence of alien species like *Polygonum perfoliatum* (mile-a-minute vine) was noted with dismay.

A second location in the park, high on a ridge in an open forest of beech, white oak, black birch and mountain laurel, offered other interesting ferns. These included *Dryopteris cristata*, *Osmunda cinnamomea*, *O. claytoniana*, *Phegopteris hexagonoptera* and *Thelypteris noveboracensis*. Beech drops (*Epifagus virginiana*) and crane fly orchis (*Tipularia discolor*) were notable angiosperms blooming on the forest floor. Exiting the park over a bridge spanning Deer Creek we looked down at the only site where the Maryland darter made its home until its apparent extinction about ten years ago.

From here we headed north, crossing the falls of the Susquehanna over the Conowingo Dam and bridge. This old hydro-facility dates back to the 1930's, contrasting historically with the Peach Bottom nuclear plant visible down river. A left turn onto S.R. 222 soon took us across the Mason-Dixon line (named for two surveyors hired in the early 1800's to settle the disputed border between Maryland and Pennsylvania) and into Lancaster County, home to Amish and other farmers exploiting its rich, limestone soils. Serpentine rock outcrops stood out in several places as "islands" of pines, surviving on the low calcium, heavy metal laden soils of these "barrens." Finally, heading west on S.R. 372, our third stop was reached at **Lock Twelve Park** near Holtwood, Pennsylvania, after re-crossing the river on the high Norman Wood Bridge. The river gorge here is

spectacular, full of small islands and rare plants – a naturalist's dream. The park surrounds the 12th lock on the old canal. It was in this area that the late Edgar Wherry found several hybrid spleenworts, and, with a prescient "sense of place," several of us were wearing our *Asplenium* hybrid-triangle T-shirts.

A streamside trail below the picnic area led to impressive sandstone cliffs harboring large colonies of *Asplenium montanum* and many fine specimens of *Asplenium pinnatifidum* (the allotetraploid hybrid of *Asplenium rhizophyllum* with *A. montanum*.) And then – the eye-popping sight of two magnificent plants of *Asplenium x trudellii* – the rare backcross hybrid of *A. pinnatifidum* with its *A. montanum* parent! The parental genes were well represented and beautifully integrated into the sturdy form of this hybrid. Other spleenwort hybrids have appeared at this site in the past – Scott's (*A. ebenoides*), Bradley's (*A. bradleyi*), and Graves' (*A. x gravesii*). *Woodsia obtusa* was occasional on the rocks. Large colonies of polypody fern were tentatively identified as the sterile tetraploid hybrid of *Polypodium virginianum* and *P. appalachianum*. The fronds were intermediate in narrowness and segment roundedness. It appears that the taxonomy of eastern polypody is more complex than once thought – Isn't that always the way?

Our box lunches were augmented deliciously with genuine Amish shoofly and lemon pies – these supplied by Jim Parks' thoughtful wife. All too soon it was time to push on to **Kelly's Run Gorge** on the east side of the river in a large recreation area at McCall's Ferry. A pleasant stream here lies in a steep ravine, landscaped in *Rhododendron maximum*, eastern hemlock and red oak, giving it a northerly aspect. Many woodland ferns were abundant, but the focus was on a large, northwest-facing exposure of Wissahickon mica schist uphill on the Kelley Run Trail. This large rock outcrop provides a stable thermal mass which has not flooded or frozen over long geologic periods, and its deeply shaded, moist crevices are home to two species of Appalachian gametophytes – the tangled, bright green, ribbon-shaped thallus of *Vittaria appalachiana* and the dark green, "hairy" filaments of *Trichomanes intricatum*. Flashlights and hand lenses were quickly focused on these amazing ice age relicts, especially with the discoverers of this site – Don Farrar and Jim Parks among us. The *Vittaria* gametophytes

cont. on page 30



Asplenium montanum
Mountain Spleenwort



Asplenium x trydekkuu
Trudell's Spleenwort



Asplenium pinnatifidum
Lobed Spleenwort

II. Susquehanna Gorge *continued from page 29*

resemble liverworts without midribs, while the *Trichomanes* wefts resemble moss protonema. These remarkable plants were, in fact, first described by mystified bryologists. According to Don Farrar, their sporophytes probably did not survive freezing during the last Ice age, but the hardier gametophytes persisted, reproducing by fragmentation and gemma production in low-light conditions where, with their high ratio of chlorophyll b/a, they could out-compete bryophytes. *Trichomanes* is found farthest north – even into Vermont, indicating perhaps that its sporophytes persisted longer and spore dispersal distributed gametophytes more widely. The gametophytes surviving today are diploid, and their gemmae may be dispersed locally by wind or farther afield by birds, spiders, insects, cave crickets and salamanders.

In **Safe Harbor**, at a wooded site near the dam bearing that name, we hiked down a steep slope in the upland forest (tulip poplar, ash, oak et al.) where a seep provides dependable water. Thriving here were plants of *Dryopteris intermedia*, *D. carthusiana* and their hybrid *D. x triploldea*. This hybrid looks like a large version of its parents. It has the asymmetrical basal pinnales of its *D. carthusiana* parent and the tiny, glistening glands of its *D. intermedia* parent. Other common woodland species were rediscovered here, but the special finds were large stands of fertile glade fern (*Diplazium pycnocarpon*) and Goldie's Fern (*Dryopteris goldiana*.)

Our final destination was a limestone area on private land near 2nd Lock Road in **New Danville**. At this site a second growth forest of sugar maple and black birch shades cliffs and bedrock of limestone festooned with lovely specimens of *Asplenium* (*Camptosorus*) *rhizophyllum* – “walking” over the rocks, *A. trichomanes*, *Cystopteris bulbifera* (with bulblets,) *C. tenuis*, and *C. protrusa*. The latter two are difficult to distinguish, but *C. tenuis* (a lot of which used to get lumped into the more northern *C. fragilis*,) is tetraploid (4n,) tends to grow in tufts on rocky, hilly, calcareous sites, sessile, well-spaced lower pinnae with rounded tips, and purple-brown stipes. *C. protrusa* is diploid (2n,) grows in mats on woodland soil, has stalked, closely-spaced basal pinnae, straw-colored stipes, and rhizome tips that protrude beyond the youngest fronds. *C. protrusa* is one of the evolutionary parents (the other is unknown) of *C. tenuis*. These calciphilic beauties were a “pterific” end to our foray, and “frondly” thanks are due Jim Parks.

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_____. 1996. *Polypodium appalachianum*, *P. virginianum*, and Their Hybrid in New Jersey and Pennsylvania. *Bartonia* 59:113-117.

Illustrations used in this report are from field notes distributed by James C. Parks.

Primary Garden Evaluation

The Rhododendron Species Foundation

Evaluation for Hardy Fern Foundation

1998

Fern Name	Accession Number	Number Alive	Overall Size	Spore past yr.	Commercial Value	Garden Worthiness rate 1 to 5
98 Adiantum aleuticum subpumilum	90/320	4	14	yes	yes	5
98 Adiantum aleuticum subpumilum	90/319	1	12	yes	yes	5
98 Adiantum pedatum	90/322	1	17	yes	yes	5
98 Adiantum venustum	90/149	lg. patch	20	yes	yes	5
98 Adiantum viride-montanum	90/323	2	30	yes	yes	5
98 Arachnoides simplicior var major	90/147	1	39	yes	yes	5
98 Asplenium trichomanes		4	2	yes	yes	5
98 Asplenium trichomanes Incisum	91/038	4	11	yes	yes	5
98 Athyrium filix-femina var Bornholmense	90/151	1	8	yes	yes	4
98 Athyrium filix-femina var Angustum	90/154	not found				
98 Athyrium filix-femina var minutissimum	90/290	3	32	yes	yes	4
98 Athyrium mesosorum	90/314	1	12	no	no	2
98 Athyrium niponicum	90/291	3	20	yes	yes	4
98 Athyrium niponicum var Pictum	90/132	9	24	yes	yes	5
98 Athyrium otophorum	90/129	8	30	yes	yes	5
98 Athyrium thelypteroides	90/153	dead			yes	
98 Athyrium vidalii	90/133	dead			yes	
98 Blechnum penna-marina	093/93	many	11	yes	yes	5
98 Blechnum spicant	90/282	3	36	yes	yes	5
98 Blechnum spicant var Serratum Rickard	90/283	4	22		yes	5
98 Cheilanthes lanosa	91/039	gone				

Fern Name	Accession Number	Number Alive	Overall Size	Spore past yr.	Commercial Value	Garden Worthiness rate 1 to 5
98 <i>Cryptogramma crista</i>	91/040	many	9	yes	yes	5
98 <i>Cyrtomium caryotideum</i>	90/146	6	34	yes	yes	5
98 <i>Cyrtomium falcatum</i> x <i>caryotideum</i>	90/286	1	18	no	yes	5
98 <i>Cyrtomium fortunei</i> var <i>Intermedium</i>	187/94	3	24	yes	yes	5
98 <i>Cyrtomium lonchitoides</i>	90/285	3	22	yes	yes	4
98 <i>Cyrtomium macrophyllum</i>	90/296	5	24	yes	yes	5
98 <i>Dryopteris aemula</i>		1	13	yes		2
98 <i>Dryopteris celsa</i>		5	35	yes	yes	4
98 <i>Dryopteris championii</i>	90/303	1	36	yes	yes	5
98 <i>Dryopteris clintoniana</i> x <i>goldiana</i>	90/375	1	40	yes	yes	4
98 <i>Dryopteris cycadina</i>	90/376	8	40	yes	yes	4
98 <i>Dryopteris cystolepidota</i>	168/94	3	22	yes	yes	5
98 <i>Dryopteris darjeelingensis</i>	186/94	5	29	yes	yes	4
98 <i>Dryopteris dilatata</i>	90/294	6	29	yes	yes	5
98 <i>Dryopteris dilatata</i> <i>Lepidota</i> 'crispa'	90/373	6	26	yes	yes	5
98 <i>Dryopteris dilatata</i> var <i>Recurvata</i>	90/139	8	40	yes	yes	5
98 <i>Dryopteris erythrosora</i>	90/126	2	28	yes	yes	5
98 <i>Dryopteris erythrosora</i> <i>Prolifica</i>	91/042	5	21	yes	yes	4
98 <i>Dryopteris erythrosora</i> var. <i>Prolifica</i>	90/297	3	20	yes	yes	5
98 <i>Dryopteris f-m</i> var <i>linearis</i> <i>Polydactyla</i>	90/135	8	38	yes	yes	5
98 <i>Dryopteris f-m</i> var <i>Undulata</i> <i>robusta</i>	90/136	8	50	yes	yes	5
98 <i>Dryopteris filix-mas</i>	90/159	2	47	yes	yes	5
98 <i>Dryopteris formosana</i>	91/050	8	33	yes	yes	5
98 <i>Dryopteris goeringiana</i>		3	30	yes	yes	4
98 <i>Dryopteris lacera</i>	90/311	1	25	yes	yes	3
98 <i>Dryopteris lepidopoda</i>	185/94	6	24	yes	yes	5
98 <i>Dryopteris ludoviciana</i>	90/160	10	40	yes	yes	5
98 <i>Dryopteris oreades</i>	183/94	missing		yes	yes	5

98 Dryopteris polylepis	90/308	1	30	yes	yes	5
98 Dryopteris pseudo filix-mas	90/161	1lg + 6sm	46	yes	yes	5
98 Dryopteris remota	91/043	5	37	yes	yes	5
98 Dryopteris sabae		5	10	yes	yes	
98 Dryopteris sacrosancta		5	25	yes	yes	4
98 Dryopteris scottii	184/94	4		no		
98 Dryopteris sieboldii	90/292	2	29	yes	yes	4
98 Dryopteris uniformis		6	10	yes	yes	3
98 Dryopteris varia var. Setosa	90/127	12	26	yes	yes	5
98 Dryopteris wallichiana	90/138	many	60	yes	yes	5
98 Dryopters crassirhizoma		4	16	no	yes	3
98 Gymnocarpium dryopteris	90/130	many	12	yes	yes	5
98 Gymnocarpium dryopteris war Plumosum	90/131	many	10	yes	yes	5
98 Gymnocarpium omayense		3	7	yes	yes	3
98 Hypolepsis punctata		many	22	yes	yes	4
98 Matteuccia struthiopteris	90/292	13	30	no	no	4
98 Onoclea sensibilis		patch	18	yes	yes	5
98 Osmunda cinnamomea		many	60	yes	yes	5
98 Osmunda claytonia		many	35	yes	yes	5
98 Osmunda regalis	90/302	many	60	yes	yes	5
98 Phyllitis scolopendrium	90/289	4	10	yes	yes	4
98 Polypodium scolieri	90/287	patch	13	yes	yes	5
98 Polystichum acrostichoides	90/145	5	14	yes	yes	2
98 Polystichum aculeatum	90/305	1	20	yes	yes	5
98 Polystichum braunii	90/164	5	19	yes	yes	4
98 Polystichum californicum	90/326	1	18	yes	yes	3
98 Polystichum californicum	91/044	4	20	yes	yes	3
98 Polystichum makinoi	91/045	8	27	yes	yes	4
98 Polystichum munitum x andersonii		5	29	yes	yes	4
98 Polystichum neolobatum	91/046	7	24	yes	yes	5
98 Polystichum polyblepharum	90/165	8	26	yes	yes	5

The Rhododendron Species Foundation

Evaluation for Hardy Fern Foundation

1998

Fern Name	Accession Number	Number Alive	Overall Size	Spore past yr.	Commercial Value	Garden Worthiness rete 1 to 5
98 Polystichum retroso-paleaceum	90/313	3	35	yes	yes	3
98 Polystichum setiferum		5	15	yes	yes	4
98 Polystichum setiferum var thompsonii	90/140	1	12	yes	yes	2
98 Polystichum sp. China	90/162	2	16	yes	yes	4
98 Polystichum squarrosum	90/312	1	16	yes	yes	5
98 Polystichum tsus-simense	90/163	8	0	no	yes	Eaten
98 Polystichum yaemonse	90/166	1	30	yes	yes	5
98 Thelypteris decursive-pinnata	90/128	many	31	yes	yes	5
98 Thelypteris phegopteris	90/155	many	14	yes	yes	4
98 Woodsia obtusa	90/310	1	18	yes	yes	5
98 Woodwardia areolata	90/167	many	23	yes	yes	5
98	90/304	1	16	yes	yes	5

Fern Festival 1999

Center for Urban
Horticulture

3501 NE 41st. St. - Seattle

June 4th - June 5th

Fri. June 4th

Plant Sale 1:00pm - 4:00pm

Coffee 7:00pm

Lecture 7:30pm

"Unusual Ferns"

By: Dr. W. Herb Wagner

Dean of American

Pteridologists

\$7 non-members • \$5 members



Sat. June 5th

Plant Sale 10:00pm - 2:00pm

FOR SALE:

Hardy & Exotic Ferns

Companion Plants

Extensive Collection of
Hostas

& Other Shade Loving
Plants

Experts on hand to help

Welcome New Members

Fred Boutin

Ronald Cukrowicz

Michael La Forest

Greg McGruer

Richard Melanson

Cornelia Moore

David Pettenski

Jean & Sidney Silber

Maggie Sprecher

Dr. Richard H. Stoneback

Satellite Evaluations

Ferns shipped in 1996 BIRMINGHAM BOTANICAL GARDENS
 Evaluation for Hardy Fern Foundation 1998

Fern Name	Accession Number	Number Alive	Number Dead	Overall Size in.	Length of new growth	Spore past yr.	Commercial Value	Garden Worthiness rate 1 to 5
Adiantum venustum		2	1	14	7 1/2	no	yes	4
Asplenium trichomanes		0	3					
Dryopteris affinis		3	0	28	15	no	yes	5
Dryopteris celsa				2				2
Dryopteris championii		1	2		8 1/2	no	no	2
Dryopteris crassirhizoma		3	0	22	13	no	yes	4
Dryopteris cycadina (atrata)		3	0	32	22	yes	yes	5
Dryopteris pseudo filix-mas		3	0	26	18	no	yes	5
Dryopteris sacrosancta		7	0	26	14	yes	yes	5
Dryopteris sublacera		2	0	17	9	yes	yes	2
Dryopteris wallichiana		5	0	27	12	yes	yes	4
Polystichum andersonii		2	2	13	10	no	no	
Polystichum setiferum		3	3	26	13 1/2	yes	yes	5
Woodsia polystichoides		2	0	8	4	no	no	1

Ferns shipped in 1997 DENVER BOTANICAL GARDENS

Evaluation for Hardy Fern Foundation 1998

Fern Name	Accession Number	Number Alive	Number Dead	Overall Size in. new growth	Length of new growth	Spore past yr.	Commercial Value	Garden Worthiness rate 1 to 5
Cheilanthes argentea		1	4	<12	3	no		
Cyrtomium caryotideum		0	5					
Cyrtomium macrophyllum		0	5					
Dryopteris affinis 'Crispa Bames'		5	0	12	4	no		
Dryopteris celsa		1	4	<12	12	yes		
Dryopteris crassirhizoma		5	0	<12	4	no		3
Dryopteris pseudo filix-mas		0	5					
Dryopteris remota		0	5					
Dryopteris sieboldii		0	5					
Dryopteris sublacera		2	3	<12	4	no	no	
Polystichum mayebarae		0	5					
Polystichum polyblepharum		2	1	12	6	yes		
Polystichum setiferum		2	2	13	10	no	no	
Polystichum setiferum		3	3	26	13 1/2	yes	yes	5
Woodsia polystichoides		2	0	8	4	no	no	1

Ferns shipped in 1996 HARRY P. LEW GARDENS

Evaluation for Hardy Fern Foundation 1998

Fern Name	Accession Number	Number Alive	Number Dead	Overall Size in. new growth	Spore past yr	Commercial Value	Garden Worthiness rate 1 to 5
Adiantum venustum	96-414	0	5				
Asplenium trichomanes	96-419	0	5				
Dryopteris affinis	96-424	4	1		no	no	1
Dryopteris celsa	96-429	0	5				
Dryopteris championii	96-434	4	1		no	no	1
Dryopteris crassirhizoma	96-439	0	5				
Dryopteris cycadina (atrata)	96-444	1	4		yes	no	1
Dryopteris pseudo filix-mas	96-449	4	1		no	no	5
Dryopteris sacrosancta	96-454	0	5				
Dryopteris sublacera	96-459	0	5				
Dryopteris wallichiana	96-464	0	5				
Lygodium Palmatum	96-469	1	1		no	no	1
Polystichum andersonii	96-476	0	5				
Polystichum setiferum	96-471	5	0	8	yes	yes	5

Ferns shipped in 1996

INNISWOOD METRO GARDENS

Evaluation for Hardy Fern Foundation 1998

Fern Name	Accession Number	Number Alive	Number Dead	Overall Size in.	Length of new growth	Spore past yr.	Commercial Value	Garden Worthiness rate 1 to 5
Dryopteris affinis	19960076	5	0	26	20	yes	yes	5
Dryopteris pseudo filix-mas	19960077	5	0	12	12	no	yes	4
Dryopteris sublacera	19960078	5	0	12	8	no	yes	4
Polystichum andersonii	19960079	5	0	21	14	yes	yes	5

Ferns shipped in 1997

NEW YORK BOTANICAL GARDEN

Evaluation for Hardy Fern Foundation 1998

Fern Name	Accession Number	Number Alive	Number Dead	Overall Size in.	Length of new growth	Spore past yr.	Commercial Value	Garden Worthiness rate 1 to 5
Dryopteris affinis 'Crispa Barnes'	1209/97A	5	0	14	10	no	yes	4
Dryopteris crassirhizoma	1207/97A	5	0	24	12	no	yes	4
Dryopteris sieboldii	1208/97A	4	1	18	11	no	yes	4
Dryopteris sublacera	1206/97A	4	1	18	11	no	yes	4
Polystichum mayebarae	1205/97A	2	1	<5	3	no	?	1

THE STEPHEN F. AUSTIN STATE UNIVERSITY ARBORETUM

Evaluation for Hardy Fern Foundation 1998

Fern Name	Accession Number	Number Alive	Number Dead	Overall Size in.	Length of new growth	Spore past yr.	Commercial Value	Garden Worthiness rate 1 to 5
Adiantum venustum		5	5	8		yes	?	?
Asplenium trichomanes		2	3	3-6		yes	?	?
Athyrium filix-femina 'Frizelliae'		4	1	3-8		no	?	?
Cheilanthes argentea		3	0	3-5		yes	yes	4
Cyrtomium caryotideum		5	0	6		no	?	4
Cyrtomium fortunei		4	1	12-15		no	?	4
Cyrtomium macrophyllum		5	0	6		no	?	4
Dryopteris affinis 'Crispa Barnes'		3	0	10-14		no	yes	4
Dryopteris affinis 'The King'		5	0	12-15		no	yes	5
Dryopteris championii		3	0	8-12		yes	yes	5
Dryopteris crassirhizoma		5	0	12-18		yes	yes	5
Dryopteris filix-mas 'Linearis polydactyla'		3	0	15-20		no	yes	5
Dryopteris pseudo filix-mas		5	0	15-18		yes	yes	5
Dryopteris sacrosancta		4	0	12-18		yes	yes	5
Dryopteris sieboldii		5	0	3-8		no	?	2

Dryopteris sublacera	5	0	10-14	no	?	?
Dryopteris wallichiana	2	3	12-15	no	?	2
Phyllitis scolopendrium 'Kaye's lacerate'	3	2	3-6	no	no	1
Phyllitis scolopendrium	3	0	3-8	yes	?	?
Polystichum polyblepharum	5	0	12-14	yes	yes	4
Polystichum setiferum	3	0	18-24	yes	yes	5
Polystichum setiferum 'Congestum cristatum'	5	0	8-10	yes	yes	4

? These need one more growing season

Polystichum makinoi continued
from page 27

auricle is more noticeably extended, a diagnostic feature in telling this species apart from *P. makinoi*. The individual pinnules are coriaceous-herbaceous, obliquely ovate, obtuse to subacute, with spiny tips which are more noticeable than in *P. polyblepharum*. The veins are more obvious in this species than in some others, particularly on the underside. The sori appear in two series on the pinnules covered with an indusium and may be submarginal in their placement. The spores are brown.

Culture: *Polystichum makinoi* needs a humus-rich, slightly acidic soil which must be kept moist if it is to be at its best. It is a strong grower in areas of adequate humidity but in areas of lower humidity, it is of more cautious growth, rarely exceeding eighteen inches in height. It seems to appreciate the proximity of large rocks but can be grown just as well in open ground. *Polystichum makinoi* is quite adaptable, being at home in both northern and southern gardens. It is one of the first to come up in the spring, a sometimes worrisome trait which it shares with other "early risers" such as *P. acrostichoides*, *P. braunii*, and *P. retroso-paleaceum*. For this reason these must be protected from spring frosts. Being one of John Mickel's favorite holly ferns, it is heartily recommended for the woodland garden. It is quite cold-hardy and of a neat attractive appearance.

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